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14. ABSTRACT

In the late 1980s and early 1990s, the "Revolution in Military Affairs" (RMA) argued that thanks to improving technological capabilities in the areas of stand-off precision weapons, intelligence, surveillance, and reconnaissance (ISR), and command and control, wars could be effectively fought and won with minimal risk to U.S. forces. The Navy particularly refashioned its fleet based on this assumption. Recent experience, however, suggests that the promises and assumptions of the RMA were unrealistic: perfect intelligence is impossible, precision stand-off weapons are not silver bullets, and centralized control can degrade military effectiveness. Moreover, the military culture that has developed since the RMA began is one that demands certainty, micromanages, and is particularly fragile to unforeseen events. This paper sets forth an argument and first-step recommendations for returning the U.S. Navy (and the military, by extension) to such a form and culture that can win wars.

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'GAME-CHANGER':
THE ILLUSION OF WAR WITHOUT RISK

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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28 April 2017

Contents

Paper Abstract

In the late 1980s and early 1990s, the "Revolution in Military Affairs" (RMA) argued that thanks to improving technological capabilities in the areas of stand-off precision weapons, intelligence, surveillance, and reconnaissance (ISR), and command and control, wars could be effectively fought and won with minimal risk to U.S. forces. The Navy particularly refashioned its fleet based on this assumption. Recent experience, however, suggests that the promises and assumptions of the RMA were unrealistic: perfect intelligence is impossible, precision stand-off weapons are not silver bullets, and centralized control can degrade military effectiveness. Moreover, the military culture that has developed since the RMA began is one that demands certainty, micromanages, and is particularly fragile to unforeseen events. This paper sets forth an argument and first-step recommendations for returning the U.S. Navy (and the military, by extension) to such a form and culture that can win wars.

The term 'game-changer' is a favorite buzzword in modern culture. From the sports field to the boardroom, it describes any event or development that challenges the rules, conventions, or assumptions by which we have come to operate. In the military, most 'game-changers' since World War II have been driven by new technologies that promise to change the way we fight by increasing range and lethality, improving precision, improving defense, and generally reducing the amount of risk to U.S. forces. 'Game-changing' technology promises that wars can be won with the push of a button, without having to go into Harm's Way.

This is a simple, antiseptic vision of war, but not a new one. For centuries, new technologies have been heralded as transforming war, or even ending it. In 1897 the Maxim Gun was hailed as a "peace-producing terror," as its increased lethality would make wars too costly for reasonable men and nations to wage.[1] Swedish chemist Alfred Nobel imagined the raw destructive power of dynamite would so shock nations that they would elect to ban war, rather than lose whole army corps in an instant.[2] These inventors and their acolytes imagined technology would be a 'game-changer;' sadly, they were wrong.[3]

But where past 'game-changers' relied on the prospect of certain death as a deterrent from war, modern technologies are doing the opposite: they promise victory at lower cost. Stand-off precision weapons enable the U.S. military to tailor conflict as never before: to strike enemy targets without collateral damage, minimizing or eliminating both the risk to its own forces and the propensity for blowback. They promise that the violence of war can now be sterilized to a large degree, and that victory can be achieved with minimal risk.

This has led to a growing culture of risk aversion within the U.S. Navy, and the U.S. military at large. Leadership is increasingly concerned with preventing 'bad things' from happening, from the catastrophic to the mundane. In planning, every operation undergoes a rigorous operational risk management (ORM) process that identifies and analyzes "risk to

mission" and "risk to force," then sets out considerations that will offset those risks, thus improving the chance of success.[4]

Such an altruistic effort may understandably arise from the institutional pressures of a peacetime force. Yet a review of history suggests the notion that risk can be minimized, much less removed from war is fallacious and, moreover, dangerous. It promotes a leadership culture that demands certainty—an impossible task. It contributes to the growing practice of micromanagement throughout the force. When 'bad things' inevitably happen, they are not recognized as products of uncertainty or friction (as they often are), but evidence of poor planning or bad leadership. This attitude could make the Navy a fragile force, despite all its impressive technology.

This paper will argue that to be a truly effective fighting force, the U.S. Navy and military must rediscover a clear and sober understanding of risk and uncertainty in war, and how to *embrace* risk even while imposing it on the enemy.

Why Fear Risk?

That the military tends to be the most stoic and conservative of establishments in American society is an unflattering stereotype, but hardly an unfair one. Solemnly charged with defending the nation, the U.S. military tends to practice what it knows, and typically only changes its *modus operandi* when compelled by dire circumstances. Military culture and minds naturally gravitate toward the known, the concrete, and the tried-and-true; it is therefore in their nature to seek minimal risk in combat as well.[5] Yet the present attitude toward risk is not merely a product of old neuroses. In addition to the military's natural reticence, purveyors of new technologies have claimed it is now possible not only to fight, but to *win* with minimal risk: through the use of stand-off precision weapons, cyber tools, etc, the promise of the 'Revolution in Military Affairs' (RMA).[6]

The RMA's avowed purpose of integrating advanced technology into every aspect of warfighting, particularly command, control, communications, and computers (C4) and intelligence collection (ISR), has driven the per-unit cost of new ships, platforms, and weapons to incredible new heights. In a constrained budget environment, in which those ships and aircraft are less plentiful, the per-unit value becomes much higher.

Enabled by improvements in communication technology, higher headquarters now has the unprecedented ability of real-time, direct access to individual units—first-hand participation in Special Forces raids, for example. In an increasingly risk-conscious environment, it is only natural for such headquarters to intervene in order to prevent 'bad things' from happening to a subordinate unit.[7] All these things spring from, and contribute to, an increasingly risk-averse culture.

The Revolution in Military Affairs

The RMA was not the first time war had undergone such a paradigm shift: gunpowder, rapid-fire weapons, air power, and nuclear weapons had each, in their time, driven substantial changes to how militaries thought about, prepared for, and fought wars. New and rapid advances in missiles, computers, communications, and robotics were at the cusp of providing new military capabilities every bit as destabilizing as those of the past. But in each historical case, new tactics, techniques, procedures, and sometimes wholesale reorganization had to be developed before technology could realize its greatest impact. This was to be accomplished by the RMA: a deliberate Defense Department effort from the 1980s and 1990s to expand the U.S.' technological advantage by incorporating new technologies into as many platforms and systems as possible.[8] By melding new technologies into every aspect of warfighting, operators would be able to engage the enemy at distance with precision-strike weapons aided by up-to-the-minute intelligence fused into a global operating

picture, all while tactical units consulted with theater and national leadership. It was a glorious mirage.

The Pentagon sanctioned myriad initiatives to bring emerging, cutting-edge capabilities to the warfighter: capabilities that promised to provide "near-perfect clarity and accuracy" to U.S. forces worldwide, seamlessly integrating every aspect of military power across all domains.[9] Battles, even wars, could now be won while exposing one's own troops and assets to minimal danger. The RMA promised to enable victory without risk.

Shaping a New, Modern Force

The component programs of the RMA had a difficult and expensive task. With the pace of technological advancement rapidly outcycling the defense research and development (R&D) and acquisitions processes, the technology of each new ship and platform would be obsolete almost before it could be fielded. With each new innovation initiative of the RMA, most recently the 'Third Offset Strategy,' systems and platforms must be able to accommodate regular and frequent upgrades.[10] Such programs come at great monetary cost.

The development of the Arleigh Burke Class Guided-Missile Destroyer (DDG) in the late 1980s is an excellent example of this immediate and visible impact of the RMA. Arleigh Burke was the first class of destroyers to be designed to carry large numbers of Tomahawk cruise missiles, providing it impressive precision land-strike capabilities. It also boasted the Aegis fire control system and SPY-1 phased array radar that, along with automated guns and surface-to-air missiles, effectively created a castle wall defending each ship and, by extension, the aircraft carrier or other high-value unit (HVU) it was directed to protect.[11]

But keeping a technological edge is expensive. For comparison, a Fletcher Class destroyer built just before the close of World War II cost $149 million; a Spruance Class (1975) cost $638 million; but an Arleigh Burke Class (1991) costs $1.91 billion, adjusted for inflation.[12] Including the cost of the armament (each of *Arleigh Burke*'s 90-96 Tomahawks

cost $1.85 million), the total dollar value of a single ship is just over two billion dollars.[13]

That new platforms and weapons systems are expensive is an inconvenient truth; but the increased per-unit cost has an important, if subconscious, impact on how the Navy operates its ships. Each hull represents a significant investment in time, money, training, and resources, never mind the human lives aboard.

Shortly after the USS *Arleigh Burke* was commissioned in the early 1990s, the Navy's leadership announced a fundamental shift in keeping with new national policy following the end of the Cold War. In the 1992 white paper *...From the Sea*, Secretary of the Navy Sean O'Keefe asserted that "the free nations of the world claim preeminent control of the seas," which justified the Navy's "de-emphasis" of its anti-ship mission.[14]

Naval doctrine thus shifted from sea control to power projection. Its mindset also shifted from offense to self- and unit defense from air threats, and firepower was almost exclusively dedicated to that end. Destroyers and cruisers became important force enablers whose job was to defend those HVUs, such as aircraft carriers, which were the primary assets projecting offensive power ashore.[15] Even precision strike land-attack missions often took a back seat to defensive roles. Further, as the Navy shrank its surface warship inventory (from 203 in 1990 to 99 in 2015, its smallest complement since 1912),[16] each ship became a yet more precious resource, something that could not be risked without great impact to the Fleet as a whole. The increasing irreplaceability of each ship, combined with the expectation of certainty in military operations, helped proliferate the need for a zero-defect mentality already spreading throughout the U.S. military.

Zero-Defectiveness and RMA-Enabled Micromanagement

The "Zero-Defect" culture entered the military during the Cold War, and became a Department of Defense (DoD)-recommended policy in 1965. It took hold particularly in the space and nuclear enterprises, where the material impact of human error could have

catastrophic consequences. In a pamphlet titled *A Guide to Zero Defects*, the DoD described it as a "motivational approach to the elimination of defects attributable to human error… A voluntary program aimed at improving the quality and reducing the cost of producing and maintaining defense materiel." It was *not*, the pamphlet maintained, "an employee evaluation technique" or "a technique for censuring error."[17] Yet that was what it became as it gradually spread throughout the military.[18]

The Navy's demand for 'zero defects' has heightened with the increasing relative value of each ship since the 1990s, and advances in communication technology have improved higher headquarters' ability to command and control subordinate units. Because the military culture tends toward certainty and positive control, the need to prevent errors provides an unspoken mandate for force-wide micromanagement. Fearful that subordinates' errors would reflect poorly on them, commanders gradually migrated decision-making authority up the chain of command.[19] Enabled by advances such as video-teleconferencing (VTC), live video feed, and high-bandwidth communications, this effectively removed many authorities from unit commanders to higher headquarters. Unity of command could therefore be achieved with maximum oversight and the least propensity for human error.[20] Mistakes of any kind cost taxpayer dollars, or worse, took a ship out of the water or a plane from the air, if only for a time, and thus should be minimized as much as possible. Higher headquarters therefore held commanding officers personally responsible for any errors committed on their watch, with seemingly little regard for cause, and often with only a single sanction: relief from command and *de facto* termination.[21] The message was out: higher headquarters knew best, and mistakes would end careers.[22] Professional officers with aspirations to command therefore had a vested interest in doing and risking little in order to avoid error, an attitude which has become a leading characterization of many command climates.[23]

The Great Illusion

The joint doctrine of risk management encourages this developing culture of risk aversion. Its exercise prioritizes safety which, doctrine purports, "preserves military power." By managing risk, commanders are able to preserve their forces; and though doctrine recognizes risk cannot be removed altogether, it requires that commanders reduce it to a "reasonable" level.[24] Yet in doing so, joint doctrine and military culture conflates *risk* with *uncertainty*. The military thinks of risk in war in terms similar to risk in the stock market: that although great profit requires great risk, even minimal risk will still turn some profit. In effect, prudence, even caution, may stave off defeat, and thereby achieve victory; and since the U.S. is often fighting to maintain the *status quo ante*, that is enough.

In 1921 Frank Knight, the American economist who first examined chaotic decision-making, noted that there is a fundamental (but often unrecognized) difference between *risk*, which can be measured, and *uncertainty*, which cannot be quantified.[25] To borrow Defense Secretary Donald Rumsfeld's much-abused metaphor, risk represents "known unknowns" and uncertainty "unknown unknowns."[26] This is the context in which risk has entered the modern military lexicon.[27] Doctrinally speaking, the military manages *only risk*—the 'known (or anticipated) unknowns'—in order to control outcomes, *and accounts in no way for true uncertainty in war*. In effect, it acts and plans as if there are *no* uncertainties in war, and tacitly creates the illusion that success can be guaranteed with minimal risk and, therefore, at minimal cost.

Clausewitz, Complex Systems, and 'Black Swans'

In *On War*, Prussian theorist Carl von Clausewitz argued that war is fundamentally an act of violence characterized by chance, friction, and "a fog of greater or lesser uncertainty."[28] These traits, he argues, are inherent both to the "objective," unchanging character of war as well as its mutable, "subjective" nature, which twists and changes over

time with the advance of technology and human endeavor. In other words, these traits of war are at once *constant* and *dynamic*, exerting a force on combatants *that makes war always different than its practitioners expect or desire it to be.*

If the veracity of Clausewitz's observation is doubted, consider how the RMA has fared since its inception. The ISR systems which were to "lift the fog of war," move commanders "from blindness to total vision," [29] and provide perfect knowledge of the enemy have, if anything, made the issue *more* confusing. While collections have increased substantially, analytic power has not; and although the 'signal' may have been amplified, so too has the 'noise' from which analysts must discern it. Analysis and production require time; that cannot be reduced by automation.[30] Far from enjoying perfect knowledge, Clausewitz's observation that "many intelligence reports in war are contradictory; even more are false, and most are uncertain" is, if anything, *more* descriptive of war now.[31]

RMA-inspired capabilities have, at best, had a minimal impact; at worst, they have inadvertently made things worse. The U.S.' drone attacks against Taliban leaders in Pakistan did far more to inflame tensions with an important ally than to defeat a resourceful enemy, and by 2013 had become a "major irritant" to bilateral relations.[32] A strategic paradox has therefore developed: instead of tailored operations accomplishing expected results, their unintended consequences have often proven far more powerful and counterproductive.[33]

As the world grows more interconnected, it is increasingly made up of complex systems that are often poorly understood, much less predicted or manipulated.[34] War is such a system: it is bound up in politics, power, and human emotion, characterized by chance and uncertainty. As Clausewitz noted, the outcome of a single action in war cannot be predicted accurately;[35] the *unintended* consequences—the effects of uncertainty—almost always have the greatest impact.

Approaching such a complex system with the institutional illusion that all risk can be managed and outcomes assured creates a special fragility to, and is conducive of, 'Black Swan' events. Risk scholar Nassim Taleb defines Black Swan events as those occurrences lying well outside expected outcomes, but which carry an extreme impact. Although Black Swans may be explained in retrospect, they are, as a rule, not anticipated.[36] Black Swan events become more prevalent the more we seek to control systems, environments, and outcomes, because they arise from those potentialities we *do not* anticipate. We become victims of a false and dubious sense of security.

This emerging picture of modern war is far removed from the tidy, manageable, and risk-minimal conflict envisioned by the RMA; but it is much closer to the traditional view of war that has existed throughout much of human history. War remains, as Clausewitz observed, the realm not only of risk, but of chance, friction, and uncertainty. To disregard the presence and power of chance and uncertainty is to reject war's very character, and to seek to impose order on them is to have unrealistic expectations of conflict that will always be disappointed.

Embracing Uncertainty

If risk aversion reflects a poor understanding of war, what can replace it? If we are to return to an historical understanding of war, it may be instructive to examine how great commanders through history have used risk and uncertainty to their advantage.

Napoleon's Ploy: Austerlitz

In December 1805, Napoleon Bonaparte won perhaps his greatest victory near the Bohemian town of Austerlitz, destroying the combined Russian and Austrian armies on the fields below the Pratzen Heights. At issue was the Austrian capital of Vienna, some sixty miles to the south, which the French had captured the previous month. The French had invaded Austria in dispersed but supporting columns, as was Napoleon's practice; however,

this meant that only a portion of his force was immediately available to meet the Allied army. Outnumbered, outgunned, and exposed in hostile territory, Napoleon played upon the Allies' confidence by feigning fear. He sent embassies to his enemies expressing his desire to avoid battle, then positioned his forces to the north and east of the dominating plateau of the Pratzen Heights, from which he withdrew as the Allies approached.[37] Napoleon intentionally weakened his right flank, which guarded his line of communication to Vienna, leaving it 'in the air' and in full view of the enemy. His reserve, however, was marching from Vienna.[38]

Military convention of the day regarded high ground as the decisive point of a battlefield, so Napoleon's surrender of the Pratzen was taken as further evidence of his timidity and vulnerability.[39] The Allies occupied the heights, then initiated the battle with a general attack from the plateau down toward the weak French right. The weakened flank withdrew, drawing the Austrian and Russian troops further from their positions on the heights. With the Allies thus engaged, the hard-marching French reserve swept behind the enemy to take the Pratzen and envelop the enemy. The resulting confusion was a complete victory for Napoleon, and both Austria and Russia were forced to surrender.[40]

By conventional wisdom, Napoleon assumed substantial risk by marching dispersed into enemy territory, and still more by accepting battle with relative deficiencies in men and firepower. Yet through deception and by *embracing* that risk, he was able to translate the uncertainties of war into a *greater* risk to his adversaries, who did not realize the battle was lost until well after the trap was sprung. In effect, Napoleon converted his conventional risk into unconventional strength: the reality of his weak position helped sell his deception.

Nimitz's Gamble: Midway

In late spring 1942, what remained of the U.S. Pacific Fleet was braced for Japan's next big offensive. Many believed Japan might try to attack the fleet headquarters on Oahu, Alaska, or perhaps even California. With very few assets, Admiral Chester Nimitz could not

afford to maintain a strong defense in all sectors: his fleet was still reconstituting from the Pearl Harbor attack five months prior. Fortunately, his cryptologic unit had broken much of the Japanese codes, and had discerned that the object of Japan's next campaign would be tiny Midway Island in the North Pacific. Although many, including Naval Intelligence in Washington, disbelieved this assessment, Nimitz acted on it anyway.[41]

The Japanese commander, Admiral Isoroku Yamamoto, had devised a complex plan to draw out and destroy the remainder of the Pacific Fleet, including the aircraft carriers that had been absent during the Pearl Harbor raid. He envisioned first a feint toward the Aleutian Islands to distract the enemy; the main body would then attack and capture Midway, and destroy any American ships that came to respond. It was to be an enormous ambush. To maintain secrecy, as was his policy, the Japanese task groups transited the Pacific in strict radio silence. The whole enterprise hinged on perfect timing and surprise.[42]

Thus armed with intelligence suggesting Yamamoto's plan in some detail, Nimitz made a great gamble and threw all his available ships, including his only three aircraft carriers, toward Midway. He also engaged a deception campaign to convince the Japanese that their secrets were safe, and that the Midway invasion would be unopposed. Outnumbered, the American fleet had achieved tactical and operational surprise: it had arrived north of Midway ahead of the enemy, and were able to attack the Japanese carriers after they had launched their first wave of aircraft against Midway.[43]

Although the battle was hard-fought by both sides, the American victory was enabled in large part by Nimitz's understanding of risk and uncertainty in war. Although the force he cobbled together represented the lion's share of his combat power, and was still outmatched by the Japanese force, superior intelligence gave him the element of surprise.[44] That surprise forced the Japanese to react to a new and unforeseen development, giving the Americans the initiative and the ability to drive the battle. Yamamoto, conversely, made the Japanese fleet

fragile to surprise: by designing a complex plan using dissociated task groups separated by large expanses of ocean, success had to be driven by carefully-synchronized timing. Because the groups were under strict radio silence (which left them unsupported and without effective reconnaissance), any unforeseen event could derail the entire enterprise. Whereas Nimitz increased his enemy's risk by deceiving him, Yamamoto's overconfidence blinded him to the substantial risk and uncertainty he had taken upon his own forces.

Lessons from the Past

These lessons have many implications for modern warfare, but three observations are particularly germane. First, both Napoleon and Nimitz used deception, explicitly or not, to *generate uncertainty* in the enemy's mind—or, better, *to make him certain of a falsehood*. In essence, they *accepted* the inherent risk to their own forces imposed by the enemy, their situation, and circumstance; and rather than try to *minimize* that risk by thinking defensively, made the *enemy's* risk much greater by amplifying the uncertainty of war. Second, they generated uncertainty for the enemy by seizing the *initiative*: not necessarily by going on the offensive, but by calling the shots and forcing the enemy to react. Third, they seized and preserved their initiative by giving themselves *options* while denying them to the enemy, and possessing both the physical and mental flexibility to use them. This is a concept Nassim Taleb describes as 'antifragility:' a system or mindset that *improves* (that is, *gains utility*) when it breaks. Such a mentality does not seek to prevent 'Black Swan' events, far from it; for when such events happen, its optionality and flexibility leave it in a position to *make use of* the unforeseen.[45]

Antifragility in War

Because there can be no absolute certainty in war, commanders must learn to endure, even capitalize on, uncertainty. In the realm of business, Taleb observes that strategic planning "makes the corporation option-blind, as it gets locked into a non-opportunistic

course of action."[46] Military planning has grown to rely upon prediction as a sort of *faux* certainty at the expense of flexibility; but when predictions are inevitably wrong, or at best inaccurate, micromanagement has often already compromised forces' ability to respond appropriately to the new reality.[47] Instead, antifragility suggests that every unexpected event, every setback, has within it the seeds of opportunity, if not opportunity itself. It is a matter of *optionality*: putting one's mind and force in a position to benefit to some extent regardless of the outcome, and thereby having "more to gain than to lose."[48]

Toward an Antifragile Force

To reverse the present trend toward fragility, it is necessary for military culture to first break free from blind adherence to doctrine and 'the boss is always right' mentalities, and allow flexibility and innovation down to the lowest levels. First, and most critical, the military must engender the mindset (as outlined above) that does not fear risk and uncertainty, but chooses to find opportunity in them. This requires a fundamental culture shift, a *relearning* of what war is and what it is not, and of the limits of what can and should be controlled. Second, it requires a resilient *physical* force: platforms, systems, and weapons that are resilient, capable, and flexible enough to enable the antifragile mindset to be realized. Toward those ends, several recommendations present themselves, three cultural and three physical:

- *Utilize Freeplay Exercises.* The Navy's training and certification process for deploying ships has devolved to a series of scripted events. Less regard is shown for the realities of potential conflict than for successfully completing certain performance wickets in a doctrinally-sound fashion. Opposing forces in such exercises are often imaginary, or nominally represented by a few ships with little experience with enemy tactics. Such training may be useful for 'checking the box' before going to sea, but not for helping commanders and crews to *think* in combat. A better alternative may be found in the Navy's Fleet Problems

of the 1920s and '30s, or the Army's Louisiana and Carolina Maneuvers of 1940 and 1941, which helped expose shortcomings in doctrine on the eve of World War II.[49] Free play in a relatively benign environment will help the entire chain of command grow comfortable with making tactical and operational decisions amid the uncertainties of combat.

- *Mission Command in Fact, Not Merely in Theory.* "Mission Command," the practice of devolving decision-making to the lowest possible level by providing "Commanders' Intent"-style guidance, is integral to Joint doctrine, yet because of the cultural issues outlined above, it is rarely practiced.[50] This command style cannot simply be activated in time of war; it must be practiced constantly. The philosophy behind Mission Command must be revitalized, and the zero-defect micromanagement that is anathema to it must be weeded out of the command climate. This admittedly requires a full culture shift, which is difficult to achieve with even ample time and resources. One way to accomplish it rapidly might be to change the criteria by which the military promotes and chooses its leaders.

- *Reassess Qualifications for Promotion and Command.* At present, promotion and command selection are driven largely by how an officer looks on paper, frequently according to quantitative metrics: how many awards they have, what tough jobs they may have taken, how many mistakes they have made, etc.[51] Thanks in part to the zero-defects mentality, officer and enlisted evaluations in many services have inflated to the point that a military member must *appear* to have a flawless record if they hope to promote.[52] This is not only unrealistic, but it tightens the grip of zero-defect micromanagement. War-winning qualities must not be sacrificed to ease peacetime administration.[53] What should be *most* important in a prospective commander is their ethical character, ability to innovate, and ability to learn from mistakes. Because these critical traits are difficult to reduce to a metric, perhaps it is necessary to rely upon a Commanding Officer's (and perhaps subordinates') candid

qualitative assessments instead. Such was common practice even at the height of World War II.[54]

- *Continue and Expand 'Distributed Lethality.'* The surface fleet's new principle of "distributed lethality" is an encouraging first step in undoing some of the mistakes of the RMA by returning anti-ship weapons to surface platforms. Making each ship, or at least as many as possible, a threat to the enemy will help to generate uncertainty in adversaries' assessments.[55] Ships will be able to resume all their basic, historic functions: scouting, maneuver, and competing for sea control using defensive *and* offensive weapons.[56] This increase in capability will make them far more flexible and useful to the antifragile commander.

- *Develop Resilient Logistics.* "What I want to avoid is that my supplies should command me," Napoleon's mentor Guibert once wrote, and even a modern force still relies heavily upon its supply chain.[57] Logistics procedures and assets must be able to keep ships supplied in time of conflict. With distributed lethality will inevitably come a greater demand for fuel, ammunition, and repair parts, as well as more frequent need for resupply. Further, a ship's primary lethal weapons, vertically-launched missiles, cannot currently be reloaded at sea. Without such a capability, and without a sizeable number of logistics ships resupplying more warfighters, the benefits of distributed lethality will be limited.

As more offensively-armed ships go into Harm's Way, distributed lethality also means "distributed vulnerability." The "preeminent control of the seas" envisioned in 1992 can no longer be assumed. Ships in combat will take damage—a very near danger, as the experience of HSV *Swift*, USS *Mason,* and USS *Ponce* off the Yemeni coast in August 2016 will attest.[58] Yet at present, the Navy lacks the requisite facilities to repair ships in a timely fashion: damaged ships in recent decades (such as the USS *Samuel B. Roberts* and USS *Cole*) had to be withdrawn from theater completely, repaired in the United States, and did not return

to service for more than a year.[59] As an enabler, logistics plays a vital role in making a military force flexible, able to respond as its commander requires. The more resilient and flexible its logistics, the more resilient and flexible a force can be.

- *Prioritize Lethality, Resilience, and Survivability in Future Ship Designs and Modifications.* Lethality, as discussed above, is and must be one of the basic capabilities of any naval platform. Resilience and survivability, once points of pride for the U.S. Navy,[60] have also fallen by the wayside as complex technologies are placed within more fuel-efficient and complex hulls. These brittle technologies are apt to fail when deployed to less-than-optimal combat environments.[61]

Redundancy, Taleb observes, is a critical trait of antifragile systems: it enables survivability.[62] A loss of redundancy in the name of expediency risks a loss of capability altogether. Future ship designs must also be capable of carrying sufficient inventory to fight and win a nominal ship-to-ship battle without running out of weaponry. Redundancy prioritizes the tried-and-true over experimental systems: no ship, such as the USS *Zumwalt*, should have to rely upon a gun that may or may not work, shooting ordnance that may or may not exist.[63] Redundancy and resilience extend to routine operations as well. For example, until it becomes possible to render cyber and space domains invulnerable to attack and exploitation, Navy ships must be able to operate in the absence of such fragile, networked capabilities as position, navigation, and timing (PNT) systems.[64]

These are but a few first steps toward rebuilding the force and spirit that carried the U.S. military to victory in past wars.

The Need for Re(tro)form

Perhaps it is human nature that tempts humanity to leap upon each new, shiny 'game-changer' that promises progress. Although we may convince ourselves that the cost of passing up such an opportunity is high, we should also consider the high cost of seizing upon

panaceas too quickly or completely.[65] Though the RMA has enabled impressive advances in technology and interoperability, it has fallen far short of its promise to recreate war into an antiseptic, science-fiction caricature. Indeed, history teaches that was not a promise the RMA, nor any RMA before it, could properly make. So now, nearly thirty years into a massive and ill-conceived priority shift, what ought the U.S. Navy and military do to regain a cutting edge? The good news is, it has already begun by realizing that a problem exists, and that our enemies have us at a philosophical (and, rapidly, a physical) disadvantage.[66] The bad news, however, is the necessary correction is apt to be long and painful.

We must forever banish all fantasies of risk-free, push-button warfare, and return to a traditional understanding of human conflict. We must change the way we lead, and the way we choose our leaders. We must convert our training style from rote procedural compliance to a laboratory-style, free-play environment in which honest error is allowed, innovation rewarded, and the highest ethics of the military profession practiced. We must amend our acquisitions philosophy to recognize that, although advanced technology is beneficial, it is not weapons that win wars, but how those weapons are used. War is the realm of uncertainty, chance, risk, friction, and fog: our *physical* force must be resilient and robust enough to enable an antifragile mindset.

"It takes the Navy three years to build a ship," Admiral Sir Andrew Cunningham once told his staff. "It would take three hundred to rebuild a tradition."[67] Over the past three decades the U.S. military has built a culture that is risk-averse, reactionary, and demands certainty: in effect, a culture of *timidity*. But in its next conflict, the United States may well find that it is not the dominant power it assumed it would always be, and a comparatively weaker combatant cannot afford to be timid.[68] If we are to have a military that can function and win amid the chaos of war, we must build and train it now.

17

NOTES

1. *New York Times*, "Terrible Automatic Engines of War," (28 March 1897). Retrieved from https://www.newspapers.com/newspage/20445679/

2. Alfred Nobel, "Letter to Bertha von Suttner," quoted in Sven Tägil, "Alfred Nobel's Thoughts about War and Peace" (1998, 20 November). Retrieved from http://www.nobelprize.org/alfred_nobel/biographical/articles/ tagil/

3. Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton, NJ: Princeton University Press, 2004). pp. 198-199.

4. U.S. Office of the Chairman of the Joint Chiefs of Staff, *Joint Publication 3-0: Joint Operations* (17 January 2017). Retrieved from http://www.dtic.mil/doctrine/new_pubs/jp3_0.pdf. p. III-19.

5. Author's experience on a Destroyer Squadron staff operating as part of a Carrier Strike Group, with insight into unit- and fleet-level command, 2011-2012.

6. Biddle, *Military Power*. pp. 196-197. Although many of the RMA's more sweeping promises (perfect communications and intelligence, for example) have proven false, those promises have indelibly impacted the military's culture and expectations.

7. Author's experience.

8. Biddle, *Military Power*. pp. 196-197.
Also James R. Fitzsimonds and Jan M. van Tol, "Revolutions in Military Affairs," *Joint Forces Quarterly* (Spring 1994). p. 25.

9. Barry D. Watts, *Clausewitzian Friction and Future War* (Washington, DC: National Defense University, 1996). p. 3.

10. Timothy A. Walton, "Securing the Third Offset Strategy: Priorities for the Next Secretary of Defense," *Joint Forces Quarterly* (Summer 2016). pp. 6-13.

11. Author's experience.

12. CDR William H. Cracknell, USN, *Warship Profile: USS Charles Ausburne / Fletcher Class Destroyer 1942-1967* (Windsor, UK: Profile Publications Limited, Sept 1971) p. 195;
Also LCDR Douglas Arthur Smartt, USN, "An Investigation of Long Term Acquisition Cost Growth Rates of United States Navy Ships" (research paper, Naval Postgraduate School, Monterey, CA, 1983). p. 23;
Also Ronald O'Rourke, "Navy DDG-51 and DDG-1000 Destroyer Programs: Background and Issues for Congress," Congressional Research Service Report RL32109 (Washington, DC: Congressional Research Service, 2011). pp. 1, 20. The per-ship cost of the Arleigh Burke Class is calculated by averaging the cost of the three ships procured in the Navy's FY2010 and 2011 budgets.

Comparing costs of different classes of ships is difficult: not only is it problematic to estimate cost per hull, but one must also account for inflation over time, competitive contracts, etc. The cost of research and development (R&D) is spread over the whole of the class. The smaller the class, the greater the cost per ship: one Zumwalt Class destroyer presently exceeds $5 billion, for example, due in large part to the high R&D costs and the fact that only two ships have been constructed. By comparison, the Navy purchased 175 Fletcher Class, 31 Spruance, and 62 Arleigh Burke Class destroyers. Although imprecise, this still illustrates the huge increase of cost due to technological integration since World War II. Increased technological cost is not limited to the destroyer fleet, of course, but those ships have historically been the workhorses of the Navy, and the most likely to face danger. They may be loosely regarded, for these purposes, as representative of the increasing cost of Defense Department warfighting acquisitions resulting from the RMA.

13. Based upon the cost per missile in the 2016 acquisitions budget. U.S. Office of the Under Secretary of Defense (Comptroller)/CFO, "Program Acquisition Cost by Weapon System: United States Department of Defense Fiscal Year 2016 Budget Request," (February 2015). p. 65.

14. Secretary Sean O'Keefe, ADM Frank B. Kelso II, USN, and Gen C. E. Mundy, Jr., USMC, *...From the Sea*, White Paper published by the Navy News Service (NavNews 048/92, 6 October 1992).

15. VADM Thomas Rowden, USN, RADM Peter Gumataotao, USN, and RADM Peter Fanta, USN, "Distributed Lethality," *United States Naval Institute Proceedings* 141, no. 1 (January 2015). p. 18.

16. Naval History and Heritage Command, "US Ship Force Levels, 1886-Present," Naval History and Heritage Command, accessed 13 April 2017, https://www.history.navy.mil/research/histories/ship-histories/us-ship-force-levels.html. Fleet strength statistics derived from publicly-available database.

17. U.S. Office of the Assistant Secretary of Defense (Installations and Logistics), *A Guide to Zero Defects* Quality and Reliability Assurance Handbook 4155.12-H, 01 November 1965, Retrieved from http://www.dtic.mil/dtic/tr/fulltext/u2/a950061.pdf. p. 3.

18. ENS Bethany Craft, USN, "End the Zero-Defects Mentality," *United States Naval Institute Proceedings* 124, no. 7 (July 1998). pp. 65-67. Also author's experience in the submarine community and as a staff officer at the tactical and strategic levels of war.

19. LTC Robert Kissel, USA, "The Hidden Cost of Down-Sizing: A Zero Defects and Risk Avoidance Mentality" (research paper, Marine Corps War College, Marine Corps University, Quantico, VA, 1999). p. 17.

20. Author's experience.

21. CAPT Kevin Eyer, USN, "Opinion: Why More Commanding Officers are Getting Fired," USNI News, 30 September 2013, accessed 15 April 2017, https://news.usni.org/2013/09/30/opinion-commanding-officers-getting-fired. There are many recent examples, particularly in the Navy, of questionable reliefs for "loss of confidence in ability to command," including the Commanding Officers of USS *Essex*

following a collision with USNS *Yukon* in 2012, and of USS *Georgia* following an allision with a buoy.
Specific examples: Cid Standifer, "Updated: Navy CO Firings," USNI News, 07 October 2016, accessed 15 April 2017, https://news.usni.org/2013/12/03/navy-co-firings.
Also Brad Lendon, "$1M Accident Costs Sub Captain His Job," CNN, 05 January 2016, accessed 15 April 2017, http://www.cnn.com/2016/01/05/politics/navy-submarine-accident-captain-relieved/.

22. Thomas E. Ricks, *The Generals: American Military Command from World War II to Today* (New York: Penguin Books, 2013). pp. 448-449. There is a legitimate and important place for "Zero Defects" in the military profession, most properly in the quality control aspects of the nuclear enterprise. But when the philosophy is applied outside such strictures it creates a dangerous command environment, and ultimately can only degrade good order and discipline and combat effectiveness, which is of primary concern here.

23. Kissel, "The Hidden Cost of Down-Sizing," pp. 11, 16.

24. CJCS, *Joint Publication 3-0*, p. III-20.

25. Frank H. Knight, *Risk Uncertainty and Profit* (1921; repr., Mansfield Center, CT: Martino Publishing, 2014). pp. 19-20.
Also Peter L. Bernstein, *Against the Gods: The Remarkable Story of Risk* (New York: John Wiley & Sons, 1998). p. 219.

26. Secretary Donald Rumsfeld and Gen Richard Myers, USAF, "DoD News Briefing – Secretary Rumsfeld and Gen. Myers," Press Conference, 20 February 2002, accessed 15 April 2017, http://archive.defense.gov/Transcripts/Transcript.aspx?TranscriptID=2636.

27. The official joint definition of risk is the "probability and severity of loss linked to hazards," and of risk management, "the process to identify, assess, and control risks and make decisions that balance risk cost with mission benefits." These are things that must be *known* to be assessed.
U.S. Office of the Chairman of the Joint Chiefs of Staff, *DoD Dictionary of Military and Associated Terms* (February 2017). Retrieved from http://www.dtic.mil/doctrine/dod_dictionary/index.html. p. 204.

28. Carl von Clausewitz, *On War*, ed. and trans. by Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976). pp. 84-85, 119, 101.

29. ADM Bill Owens, USN, *Lifting the Fog of War* (Baltimore, MD: Johns Hopkins University Press, 2001). p. 102.

30. Author's experience as an intelligence analyst and manager, 2008-2016.

31. Clausewitz, *On War*, p. 117.

32. Ayaz Gul, "Pakistani PM Urges Stop to US Drone Strikes," Voice of America News, 22 October 2013, accessed 15 April 2017, http://www.voanews.com/a/us-accused-of-unlawful-killings-pakistan-drone-strikes/1774276.html.

33. Joshua Cooper Ramo, *The Age of the Unthinkable: Why the New World Disorder Constantly Surprises Us* (New York: Back Bay Books, 2010). p. 9.

34. Ibid., p. 17.
Also Nassim Nicholas Taleb, *Antifragile: Things that Benefit from Disorder* (New York: Random House, 2012). p. 133.

35. Clausewitz, *On War*, p. 86.

36. Nicholas Nassim Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2010). p. xxii. Taleb's work on risk, uncertainty, and antifragility is rapidly changing conventional wisdom in the realms of business and international politics.
The terrorist attack of September 11, 2001 is fresh and poignant example of a Black Swan event.

37. Owen Connelly, *Blundering to Glory: Napoleon's Military Campaigns*, Revised ed. (Wilmington, DE: Scholarly Resources, Inc., 1999). p. 87.

38. James Marshall-Cornwall, *Napoleon as Military Commander* (1967; repr., New York: Barnes & Noble Books, 1998). pp. 141-143.

39. Robert Goetz, *1805: Austerlitz: Napoleon and the Destruction of the Third Coalition* (Mechanicsburg, PA: Stackpole Books, 2005). p. 110-112.

40. Marshall-Cornwall, *Napoleon as Military Commander*, pp. 144-145. Also Connelly, *Blundering to Glory*, pp. 88-91.

41. Elliot Carlson, *Joe Rochefort's War: The Odyssey of the Codebreaker Who Outwitted Yamamoto* (Annapolis, MD: Naval Institute Press, 2011). pp. 337-339.

42. John Keegan, *The Price of Admiralty* (New York: Penguin Books, 1990). pp. 220-221.

43. Carlson, *Joe Rochefort's War*, pp. 340-341.

44. Ibid., p. 345. It is notable that Nimitz's superior intelligence did not give him certainty of Japanese intentions, timing, or plans. It was possible that Midway could have been a feint, as Dutch Harbor was. The idea of perfect intelligence is a dream, and not even a beautiful one: it teaches commanders to rely almost entirely on information about the enemy and environment to tell them "the right answer," which ultimately erodes command judgement.

45. Taleb, *Antifragile*, p. 17 (footnote). Embracing risk is not, of course, license to recklessness. There is a fine, and often misidentified, line between prudence and rashness in military operations. To embrace risk is not to disregard risk; it does not replace the necessities of careful planning and good judgement. Nevertheless, the commander who has a 'bias for action' is more apt to have and exploit the initiative in a conflict, whereas the hesitant or fearful commander is more apt to react to his opponent.

46. Ibid., p. 234.

47. Author's experience as a staff officer and planner at the tactical and strategic levels of war.

48. Taleb, *Antifragile*, pp. 151-158.

49. Albert A. Nofi, *To Train the Fleet for War: The U.S. Navy Fleet Problems, 1923-1940* (Newport, RI: Naval War College Press, 2010). pp. 2-3.
Also Ryan David Wadle, "United States Navy Fleet Problems and the Development of Carrier Aviation, 1929-1933" (research paper, Texas A&M University, College Station, TX, 2005). p. 114.
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http://www.geauxguardmuseums.com/about-the-museums.

50. U.S. Office of the Chairman of the Joint Chiefs of Staff, *Mission Command*, White Paper (Washington, DC: CJCS, 03 April 2012).

51. Ricks, *The Generals*, pp. 448-449.

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53. CDR Alfred Thayer Mahan, USN, "Naval Education," *The Record of the U.S. Naval Institute*, Vol. 5, No.4 (April 1879). Quoted in Benjamin F. Armstrong (ed.), *21st Century Mahan: Sound Military Conclusions for the Modern Era* (Annapolis, MD: Naval Institute Press, 2013). p. 12.

54. RADM Frank Jack Fletcher, USN, *Report on the Fitness of Officers: Spruance, Raymond A., RADM, USN, Period from 1 April 1942 to 18 June 1942*, N. Nav. 443 (Revised May 1941), 14 August 1942. Retrieved from https://www.slideshare.net/NHHC/adm-spruances-fitrep-after-battle-of-midway on 15 April 2017.
Also Ricks, *The Generals*, pp. 452-454.

55. Rowden, et al, "Distributed Lethality," p. 22.

56. CAPT Wayne P. Hughes, USN, *Fleet Tactics and Coastal Combat* (2nd Edition) (Annapolis, MD: Naval Institute Press, 2000). p. 175.

57. Field Marshal Francois, Comte de Guibert, *Essai Général de la Tactique*, 1770. Quoted in Peter G. Tsouras, *The Greenhill Dictionary of Military Quotations* (Mechanicsburg, PA: Stackpole Books and London: Greenhill Books, 2000). p. 275.

58. Michael van Wyk, USMC, "Accepting Risk: Why the Attack on the Swift Reveals Strategic Vulnerability," *The Strategy Bridge* (blog), 01 November 2016, accessed 18 March 2017, http://thestrategybridge.org/the-bridge/2016/11/1/accepting-risk-why-the-attack-on-the-swift-reveals-strategic-vulnerability.

59. LT Christopher Cedros, USN, "Distributed Lethality and the Importance of Ship Repair," *The Strategy Bridge* (blog), 14 February 2017, accessed 18 March 2017,

http://thestrategybridge.org/the-bridge/2017/2/14/distributed-lethality-and-the-importance-of-ship-repair. Cedros highlights an important, but little-recognized, necessity: without parts, transports, and facilities on hand to repair ships in theatre, the Fleet's effectiveness will be severely hampered by *any* casualties it takes.

60. The annals of the U.S. Navy are replete with examples of ships thought to be doomed that were saved by resilient construction and sheer guts. The cases of USS *Franklin* (March 1945) and USS *San Francisco* (February 2005) are excellent examples.

61. Author's experience while serving on a Destroyer Squadron staff deployed to the U.S. Fifth Fleet (C5F) area of responsibility (AOR), 2011-2012.

62. Taleb, *Antifragile*, pp. 44-45.

63. Sam LaGrone, "Navy Planning on Not Buying More LRLAP Rounds for Zumwalt Class," USNI News, 07 November 2016, Updated 16 November 2016, accessed 16 April 2017, https://news.usni.org/2016/11/07/navy-planning-not-buying-lrlap-rounds.

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Also Fitzsimonds and van Tol, "Revolutions in Military Affairs," *Joint Forces Quarterly* (Spring 1994), pp. 28-29.

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